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Hazard Assessment Document

for the

Facilities at Test Area North (TAN) – TAN-628, TAN-633, TAN-647, TAN-648, and TAN-666

Idaho National Engineering and Environmental Laboratory

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ACRONYMS

BBWI	Bechtel BWXT Idaho, LLC
CFR	Code of Federal Regulations
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
EDF	Engineering Design File
HAD	Hazard Assessment Document
HCA	Hot Cell Annex
HEPA	high-efficiency particulate air
INEEL	Idaho National Environmental and Engineering Laboratory
LOFT	Loss-of-Fluid Test
MAR	material at risk
MCP	management control procedure
NFPA	National Fire Protection Association
NRASA	not requiring additional safety analysis
OSHA	Occupational Safety and Health Administration
PRD	Program Requirements Document
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RPSSA	Radioactive Parts Security and Storage Area
RQ	reportable quantity
SAA	Satellite Accumulation Area
SMC	Specific Manufacturing Capability
SNF	spent nuclear fuel

TAA	Temporary Accumulation Area
TAN	Test Area North
TANO	Test Area North Operations
TEDE	total effective dose equivalent
TPQ	threshold planning quantity
TMI	Three-Mile Island
WGS	Waste Generator Services

1. INTRODUCTION

Title 10 Code of Federal Regulations (CFR) Part 830, Subpart B, "Safety Basis Requirements,"[1] DOE Idaho Operations Office (DOE-ID) Order 420.C, "Safety Basis Review and Approval Process,"[2] and DOE-ID Order 420.D, "Requirements and Guidance for Safety Analysis,"[3] require that a hazard assessment be prepared for all activities for which DOE has assumed environmental, safety, and health responsibility. A hazard assessment defines the level of hazard posed by an operation or activity and assumes no mitigating systems are available. This hazard assessment document (HAD) assesses several facilities at Test Area North (TAN) Waste Generator Services (WGS) activities at TAN-628; the Hot Cell Annex, TAN-633 (which is out-of-service); the Radioactive Parts Security and Storage Area (RPSSA, includes TAN-647 and TAN-648); and the Liquid Waste Transfer Building, TAN-666 (which is also out of service).

2. FACILITY DESCRIPTION

The TAN facility, located at the north end of the Idaho National Engineering and Environmental Laboratory (INEEL), is a controlled access area for the management and operation of several nuclear and nonnuclear facilities. It was originally established to support the Aircraft Nuclear Propulsion Program, which was established in the 1950s and terminated in 1961. Since 1961, the TAN facilities have been adapted for use by various other programs, including the Loss-of-Fluid Test (LOFT) experimental program, which ended in 1985, and the Specific Manufacturing Capability (SMC) program, which is ongoing.

The mission of TAN Operations (TANO) is to safely examine, test, and monitor spent nuclear fuel (SNF), storage casks, and radioactive materials as deemed necessary by the DOE. TANO also provides interim storage for these items, while these items await final storage disposition.

There are numerous buildings, plus support structures, utilities and disposal installations located within the boundaries of TAN. A more detailed discussion of these buildings and their functions is documented in Reference 4 for facilities designated as nuclear facilities and Reference 5 for facilities classified as nonnuclear facilities.

Figure 1 shows the locations of the facilities within the TAN area.

2.1 TANO Facility Description

2.1.1 TAN-628 Warehouse

TAN-628 is a warehouse that was constructed in 1956 and has been used to store hazardous, flammable, combustible, and low-level radioactive waste. The building contains a one-story mezzanine and a two-ton bridge crane. The building is constructed of pumice block walls, with a concrete floor and a metal roof deck. The building footprint covers 19,351 ft^2 (see Figure 2 for a floor plan of the building). Attached to the southeast corner of the building is a gas cylinder storage area. Also, an outside fenced storage area is located to the south of TAN-628. The outside fenced storage area may be used to store radioactive, hazardous, and mixed wastes. TAN-628 has been turned over to TANO from SMC and is essentially empty. The building had various uses, including the storage of depleted uranium; however, the building was surveyed and determined to be free of contamination (radiation levels are at background levels) as part of the turnover.[6,7]

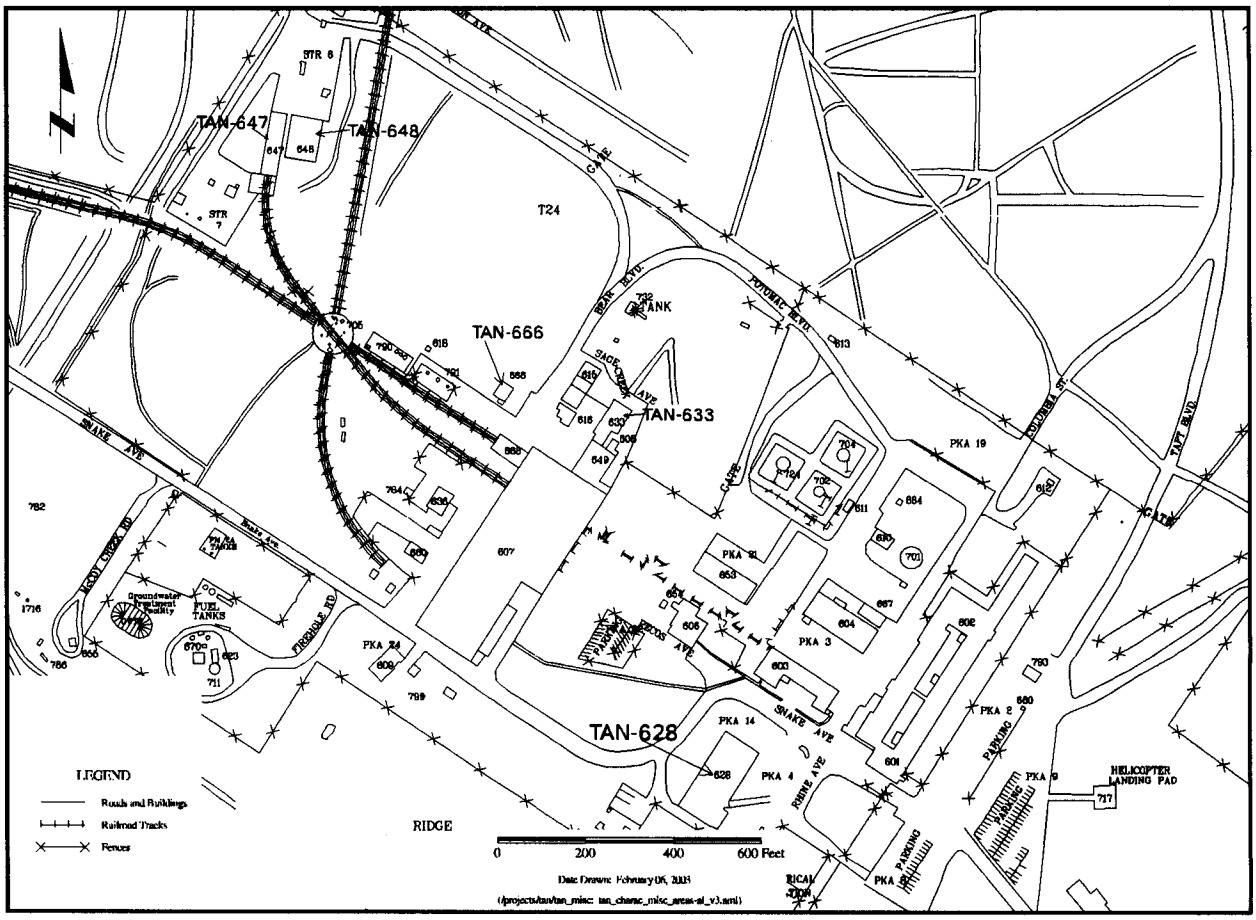

Figure 1. Facility locations within the TANO area.

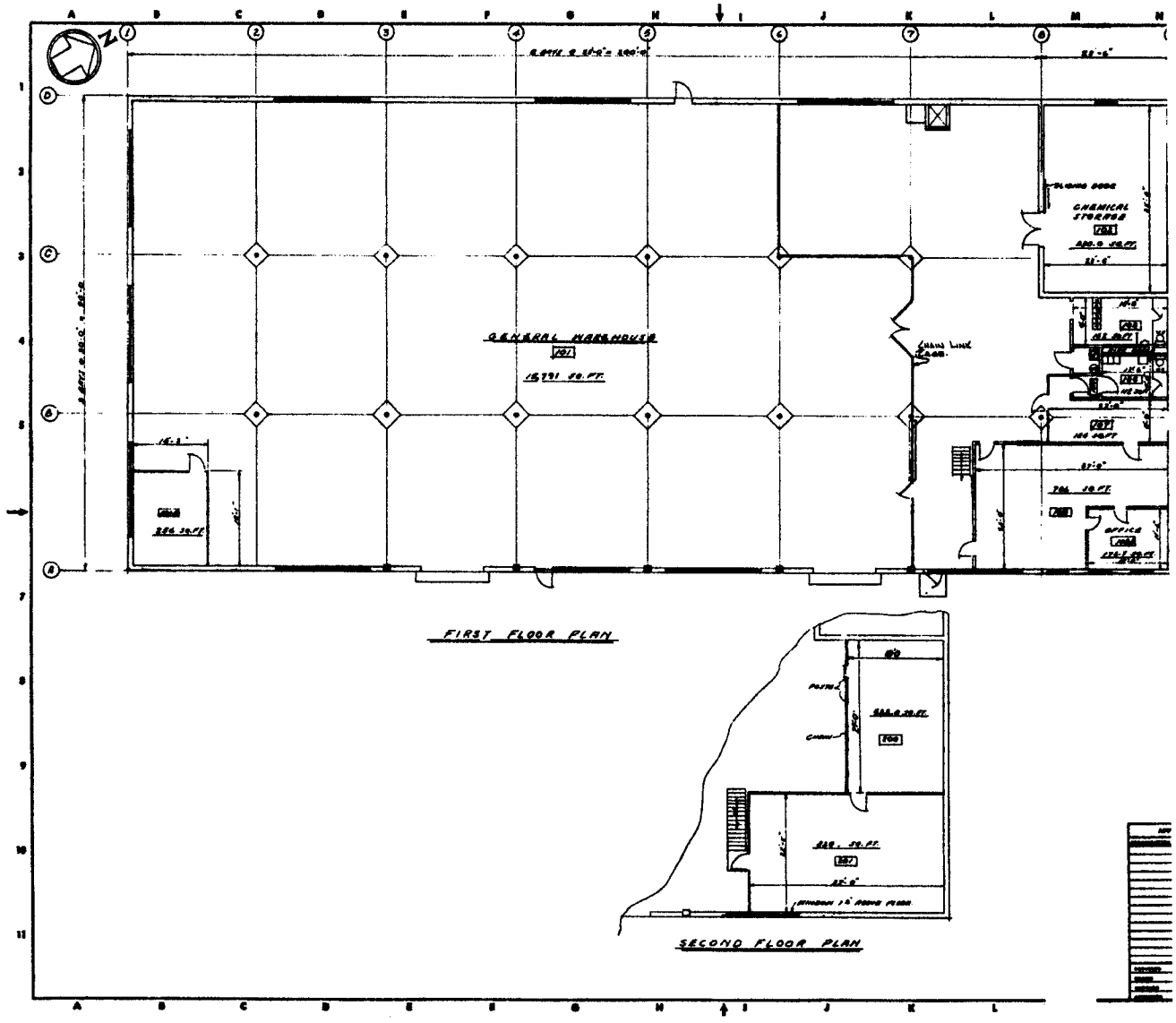

Figure 2. TAN-628 space occupancy floor plan.

TAN-628 will be used as a waste consolidation facility, including a less-than-90-day storage area for WGS, who will move from their present location (TAN-653). Waste materials will be stored in a satellite accumulation area (SAA) until 55 gal have accumulated, then the material will be placed in the Temporary Accumulation Area (TAA). TAAs have a 90-day time limit, and waste or other materials placed in the TAA will be removed to a permanent disposal facility within this time limit. Materials that cannot be placed into TAN-628 area will be maintained at the generator facility until disposition.

Processes in TAN-628 will include:

- Sampling nonradioactive (hazardous and non-hazardous) material containers
- Sampling radioactive (hazardous and non-hazardous) material containers
- Generator treatment of radioactive, hazardous, and mixed wastes
- Preparing lab-packs for shipment
- Material Exchange Program
- Resource Conservation and Recovery Act (RCRA) Recyclable Program
- Consolidating wastes into packages of compatible materials
- Palletizing waste drums and preparation for shipment
- Loading and unloading vehicles.

The Material Exchange Program is a government-wide program to reduce waste by exchanging materials of value with other government agencies. Materials may accumulate at TAN-628 for up to one year from receipt from any INEEL producer and may be released to any government agency. The Material Exchange Program would be managed in a specific storage area designated in TAN-628. Similarly, the RCRA Recyclable Program accumulates materials of value for recycling. Recyclable materials are not subject to RCRA disposition requirements and therefore may accumulate indefinitely.

There is the potential for unidentified materials to be placed in this facility and subsequently sampled. The exact composition of the material may not be known, but the hazard or properties of the material may be. For example, it may be known that the material is corrosive or flammable, but the exact chemical composition such as sulfuric acid or methanol may not be known. A reasonable understanding of the process knowledge of the waste must be known prior to accepting the waste, but the exact composition may not be known. The most conservative estimates (both for compounds and inventory) will be used until sample results are known. Waste drums received and stored at TAN-628 will normally be sealed.

Operations will include storing waste inside TAN-628 and within nearby outside fenced areas, sampling nonradioactive containers, sampling radioactive containers, preparing lab-packs for shipment, consolidating wastes into packages of compatible materials, palletizing waste drums and preparation for shipment, loading and unloading vehicles, and back-shift inspections. Modifications to support operations may include setting up tables, shelves and benches. Solid, radioactive, hazardous, and mixed waste will

be temporarily stored and managed in TAN-628. Packing material storage, such as vermiculite, will also be set up for packaging lab-packs.

Materials received may include acids, bases, oxidizers, organics, corrosives, explosives, radioactive material and radioactively contaminated material, flammables, and nonhazardous solid wastes. Waste from Environmental Restoration activities may be received at TAN-628. Table 1 outlines typical contents and quantities (not limits) of materials to be stored or used in TAN-628.[8]

Table 1. Typical contents of TAN-628.

Material	Typical Quantity (gal)
55-gal flammable storage cabinets	165
Flammable storage cabinet	100
Conditional industrial wastes	2,500
Acids	220
Bases	220
Oxidizers	220
Organics	220
Pesticides	55
Inorganic solids	2,000
Silver/Lead	110 (2,000 lb)
Battery storage	200[a]
Oil dumpster	500
Oil drums	550
Ethylene glycol mixture	110
Radioactive water w/ F001 codes	550
Radioactive Water nonhazardous	2,500
Liquid low level radioactive waste	440
Containerized asbestos	352
Containerized solid radioactive wastes	2,560

a. Quantity expressed is cubic feet.

2.1.2 TAN-633 Hot Cell Annex

The Hot Cell Annex (HCA), located in TAN-633, adjoins TAN-607 on the north side and consists of four adjacent hot cells and the necessary support areas, as shown in Figure 3. The Hot Cell Annex is out of service and the cells have been cleaned up, but residual contamination remains present.

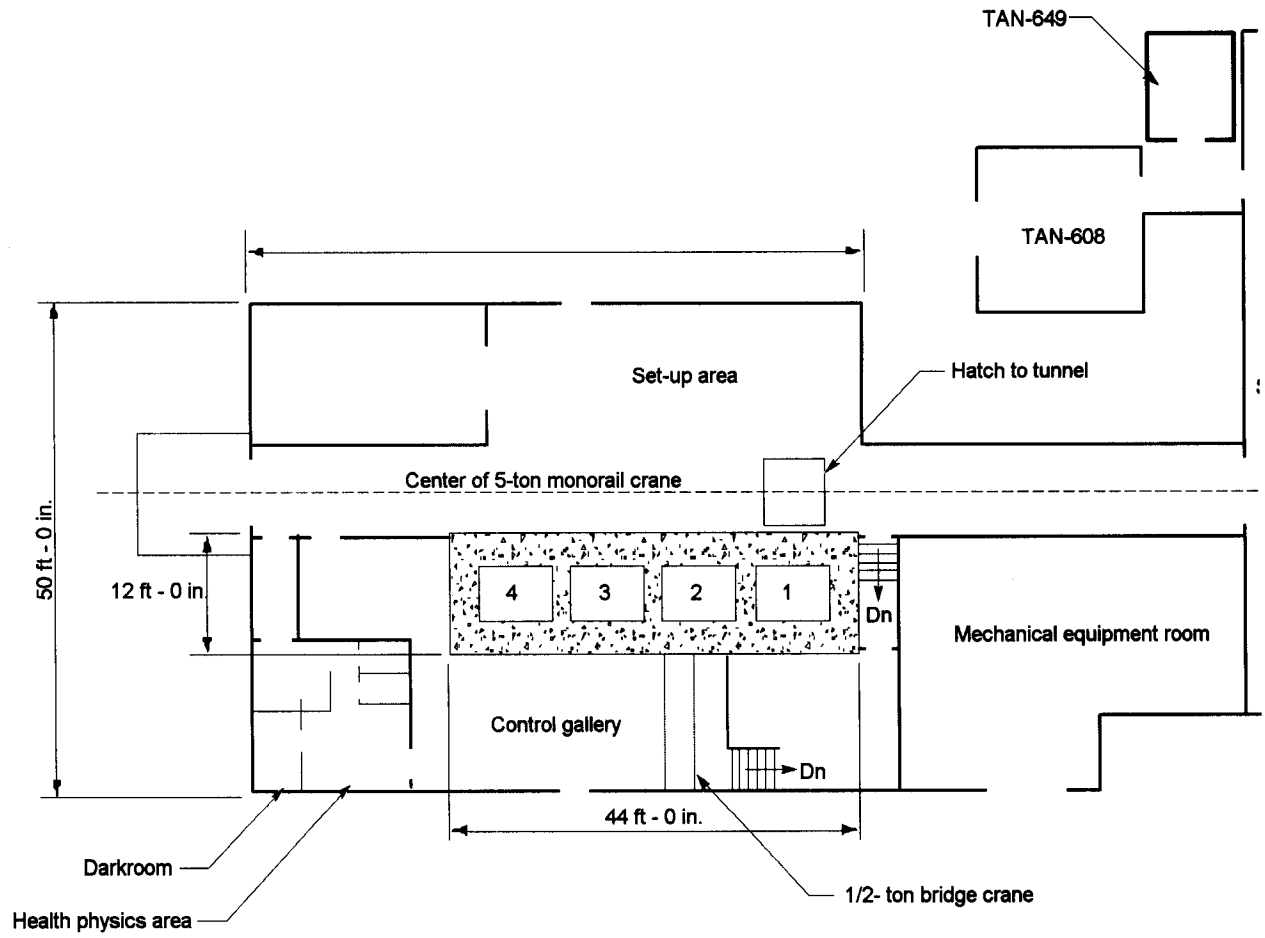

Figure 3. Floor plan of the Hot Cell Annex (TAN-633).

Allied Technologies Group supplied a self-contained cleanup system in 2001, to reduce the conductivity levels of the TAN pool water following the Three-Mile Island (TMI-2) project. The cleanup system is stored in a cargo container that is located just outside the east door of the HCA.

2.1.3 Radioactive Parts Security and Storage Area (including TAN-647 and TAN-648)

The RPSSA consists of two buildings (TAN-647 and TAN-648) and two concrete/asphalt storage pads (see Figure 1 for building locations at TAN). Items stored in the RPSSA typically cannot be stored in other facilities because of their radiological condition or size, or they are those awaiting processing or transportation. Items are packaged to contain any radioactive material, resist deterioration, and minimize fire loading.

In general, items are stored in TAN-647 or TAN-648 rather than outside on the pads, because of the protection provided by the buildings against the elements. To avoid personnel encountering unknown hazards, materials prohibited from storage in TAN-647 and TAN-648 include explosive material, shock-sensitive material, and pressurized containers. Ignitable, corrosive, reactive, or toxic materials as defined by 40 CFR 261, "Identification and Listing of Hazardous Wastes",[9] are allowed for storage only in the RCRA-permitted section of TAN-647. The RCRA storage area is currently empty and undergoing RCRA-regulated closure. For fire prevention precautions, combustible materials in TAN-647 and TAN-648 are limited to that necessary for packaging and containment.

The two buildings were constructed in the 1950s to the then-current criteria published in the Atomic Energy Commission Manual, Chapter 6301. TAN-647 is a 34 × 142-ft unheated building constructed of corrugated sheet metal on a steel frame. The north 48 ft of the floor is concrete with a capacity of 6,000 lb/ft^2; the remainder is constructed of 3 ft of select, compacted material with a rated capacity of 4,000 lb/ft^2. TAN-648 is a 69 × 96-ft unheated building constructed of corrugated sheet metal on a steel frame. The entire floor is a concrete slab with a rated capacity of 2,500 lb/ft^2. Personnel access doors are located on both the north and south walls of each building. Electrically operated equipment doors are located on the north wall of each building and also on the south wall of TAN-647.

The processes associated with the RPSSA are typical of warehousing operations. Material handling at the RPSSA is limited to hand-operated and mobile mechanical equipment because there are no permanently installed cranes or hoists. Items are limited in weight and size to that which can be safely handled by personnel or that are within the rated capacity of the available lifting equipment to reduce the risk of personal injury, material damage, or loss of contamination control.

2.1.4 TAN-666 Radioactive Liquid Waste Storage and Transfer Building

TAN-666 (which is currently out of service) is a steel-reinforced concrete structure located west of the TAN Hot Shop, across the paved access road. The facility is designed to receive and temporarily store liquid waste generated in the TAN Hot Shop, Hot Cell, and HCA. The building contains a tank vault, pump vault, filter shed, and outside concrete pad. The equipment and instrumentation are shown in Figure 4. Most of the valve manipulations are accomplished with reach rods; in this way, the physical structure of TAN-666 provides shielding for operations personnel.

The tank vault is a rectangular room with 2-ft-thick concrete walls and floor. The dimensions of the vault are 33 × 28.5 ft, with a wall height of 20.5 ft. The floor of the tank vault is 7 ft below ground level. The only entrance is through a double set of steel doors located in the center of the west wall.

The tank vault contains two 15,000-gal storage tanks (also known as Tank 1 and Tank 2) that rest horizontally, side by side, with a 5-ft-high concrete wall separating them. Tank 1 is located on the north side of the vault and Tank 2 on the south side. The floors are sloped below each tank so that any liquid spilled collects in a catch basin sump. There are two sumps, each located to the east of the respective tanks. Each tank is vented to the atmosphere and has an overflow line that discharges to its sump. The sump then gravity-drains to a surge tank located in the pump vault.

The pump vault is located to the east of the tank vault and its roof is at ground level. The walls and floor of the pump vault are 1.5-ft-thick, steel-reinforced concrete. The inside dimensions of the room are 19 × 28.5 ft, with a wall height of 20.5 ft. A 1.5-ft-thick concrete pad at grade level forms the roof of the pump vault; a single entrance man way is located at its northeast corner. A vertical steel ladder bolted to the east wall permits an operator to climb down to the pump vault floor.

The pump vault contains a vertical 600-gal capacity surge tank (also known as Tank 3) and two 200-gpm waste transfer pumps. The tank is located in the northwest corner of the pump vault and received waste by gravity flow from Valve Pit #1 (TAN-1704), the sumps, and the truck vent and overflow line. The transfer pumps are located in the south end of the vault. They transfer red liquid waste from either storage tank or the surge tank to another storage tank, or to a transfer truck for disposal.

A pump vault sump is located by the south wall of the pump vault. A float switch automatically controls its operation. When the sump reaches a predetermined level, the contents of the sump were pumped back to the surge tank.

The filter shed is attached to the south side of the tank vault at ground level. The inside dimensions of the shed are 14 × 7 × 10 ft. Access to the vault is through a double carbon-steel door located on the south side of the tank vault.

The shed contains a cyclone separator and associated piping, which was used to filter out particulates from the waste to prevent clogging and to help minimize the buildup of sludge in the storage tanks. The material collected by the separator was directed to a sludge tank. The sludge tank was designed to be removed, cleaned, and replaced. The sludge tank has been disposed of as waste material.

An 8-in.-thick 20 × 70-ft concrete pad was constructed just east of the pump vault to accommodate waste transfer vehicles used for removing accumulated liquid waste. Liquid waste was pumped from the storage tanks through an overhead pipe boom and flexible connecting hose into tank trucks parked on the pad.

TAN-666 is designed to receive and store liquid waste generated by normal operations, cleanup activities, and accidental spills of radioactive materials inside the TAN Hot Shop, Hot Cell, and HCA. Spills that cannot be cleaned up directly were washed down drains leading through valve boxes and underground piping to TAN-666. Liquid waste could also be introduced directly from tank trucks through the liquid waste fill connection or the portable sump fill connection shown in Figure 3.

All liquid waste entered the 600-gal capacity surge tank by gravity flow. High and low liquid level sensors monitored the tank and display information in the Radiological Control Technician (RCT) office. When the high liquid level sensor is activated, an alarm sounds in the RCT office. The liquid waste pump is then manually turned on and the waste is pumped through the filter units to one of the storage tanks.

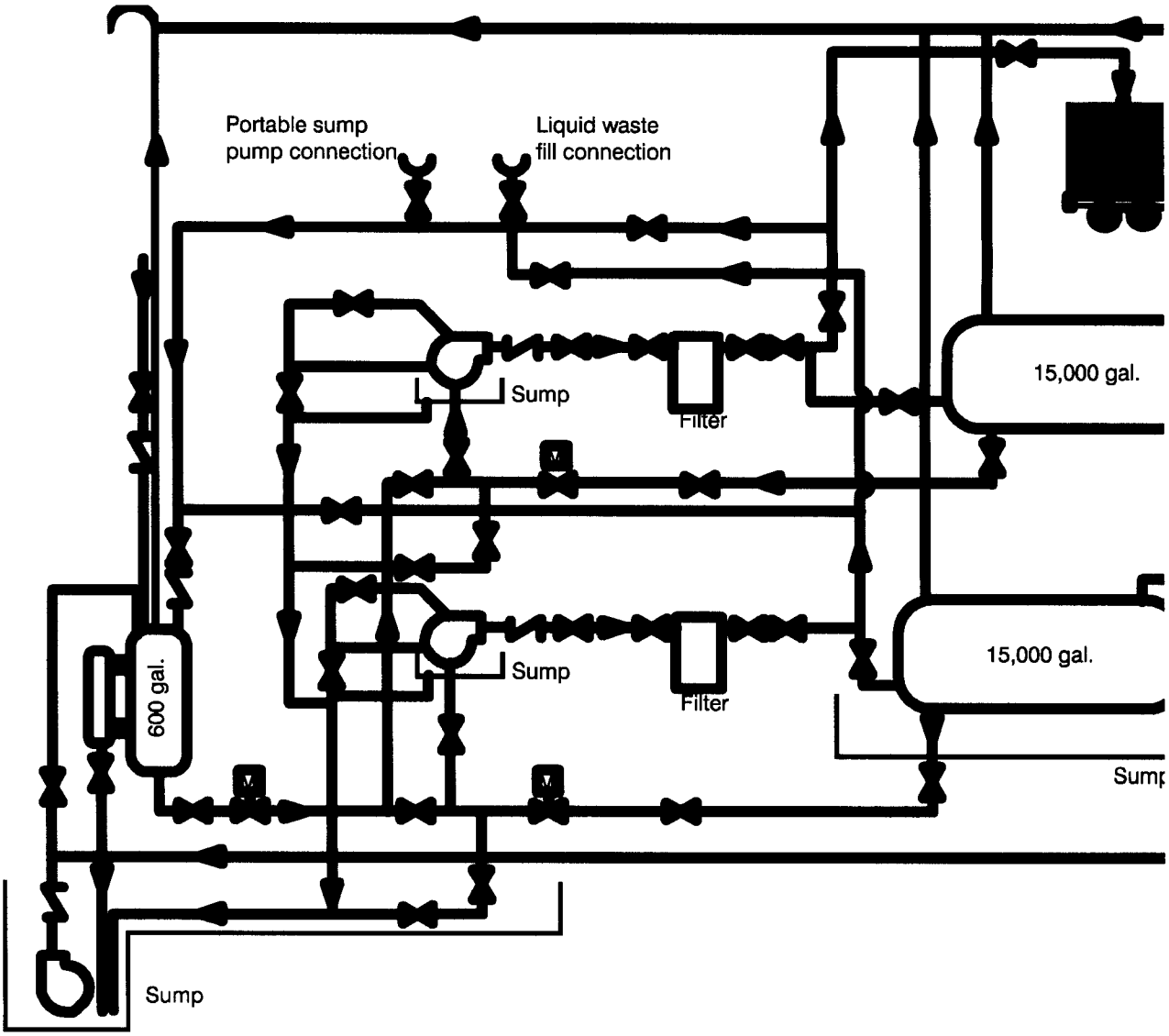

Figure 4. Equipment and instrumentation of the Radioactive Liquid Waste Storage and Transport Building.

Upon reaching the maximum level in the storage tanks, the waste was pumped into an outside tank truck and sent for processing or treatment. The pump-out system is designed so that any liquid, that remains in the pump-out transfer line, drained back into the storage tanks or into the tank truck upon completion of the liquid waste transfer.

Samples of the liquid waste may be removed from either storage tank via small diameter stainless-steel sampling lines connected to sampling ports located on the east exterior wall of the tank vault adjacent to the control panel.

3. MATERIAL INVENTORY

To assess the hazards associated with each facility, the inventory of radioactive material and chemicals is identified. The inventory identification process involved discussions with TAN personnel and a walk-down of each building.

3.1 TANO Facilities

The material inventory for TAN facilities that are considered in this hazards assessment is described in the following subsections.

3.1.1 TAN-628 Warehouse

At the present time the warehouse does not contain any radioactive or hazardous materials; however, with WGS moving into the building (from TAN-653)[a] sometime in the near future, radioactive, hazardous, nonhazardous solid, and other wastes will be stored in the building. Table 1 outlines typical contents and quantities of materials that may be stored or used in TAN-628. The gas cylinders stored at the TAN-628 gas cylinder storage area usually contain helium, argon, acetylene, nitrogen, carbon dioxide, and oxygen for cutting and welding operations and P-10 gas for use in radiological instrumentation. Approximately eight bays (with a center area for empty cylinders) segregate the different types of gases and each bay may contain up to 48 cylinders. The outside fenced storage area presently contains radioactive materials belonging to SMC. Material inventories for TAN-628 must be maintained less than the criteria to preserve the less than Category 3 categorization and the low hazard classification.

3.1.2 TAN-633 Hot Cell Annex

The HCA has been decontaminated; however, residual contamination still exists in the cells and in the overhead. A radiological control (RadCon) survey of the building performed in January 2002 indicated that radiation levels were less than 1 mR/h (general area) and contamination levels on the floor (based on a smear survey) were less than the Program Requirements Document (PRD)-183, "Radiation Protection -INEEL Radiological Control Manual,"[10] Table 2-2 limits.

Allied Technologies Group supplied a self-contained cleanup system in 2001 to reduce the conductivity levels of the TAN pool water following the TMI-2 project. The cleanup system is stored in a cargo container that is located just outside the east door of the HCA. Engineering Design File (EDF)-2172, "Source Term Determination for Shipping Requirements of the ATG Resin Used for TAN

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a. Low radiological hazard categorization per R. M. Stallman letter to G. O. Hayner, "TAN-653 Hazard Categorization," OPE-CFA/TAN-00-008, April 3, 2000.

Storage Pool Clean-up,"[11] (also see Table 3) estimated the radionuclide source term associated with the three ion exchange vessel resins used in the cleanup. The source term calculated in EDF-2172[11] will be used as the basis for selection of the Department of Transportation classification of shipping container and/or shielding requirements for shipment. Radiation levels up to 20 mR/h can be expected in the cargo container.

3.1.3 Radioactive Parts Security and Storage Area (TAN-647 and TAN-648)

The RPPSA is used to store material that is radioactive and/or contaminated. A RadCon survey of TAN-647 performed in December 2002, indicated radiation levels ranged from less than 0.5 mR/h (general area) to 15 mR/h on contact with the stored items and equipment in the south end of the building (the north end is empty and general area radiation levels are <0.5 mR/h). Radiation levels in TAN-648 (from the same survey) showed radiation levels from <0.5 mR/h (general area) up to 100 mR/h on contact with equipment containers in the high radiation area (as defined in PRD-183[10]) in TAN-648. Contamination levels on the floor and on the outside of the containers (based on smear survey) were all less than the PRD-183,[10] Table 2-2 limits. Contamination does exist on the equipment itself; however, all equipment is in some form of containment – either wrapped and/or boxed.

Among the equipment stored in TAN-648 are 34 sealed Cesium (Cs)-137 sources and these sources contain up to 30 Ci of activity each. These sources are stored in lead and depleted uranium containers that are scheduled for disposal in the near future. Approximately 534 sintered metal and FLT-2 filters are located in the fenced area of TAN-648. These filters were used for the TMI project and have radiation levels up to 250 mR/h on contact. Specific characterization details on the activity contained in these filters are incomplete but could well exceed the Hazard Category 3 threshold values. These filters are also scheduled for disposal in the near future. The area also contains a cask furnace used for the TMI project that is presently stored behind concrete blocks due to high radiation levels. Specific characterization details on the activity contained in this furnace are incomplete. Several waste boxes and drums containing lead, which is a part of an Inspector General investigation, are also stored in TAN-648.

3.1.4 TAN-666 Radioactive Liquid Waste Storage and Transfer Building

The Radioactive Liquid Waste Storage and Transfer Building (TAN-666) is used to store liquid waste in tanks from the Hot Shop, Hot Cell, and HCA. A RadCon survey of the TAN-666 pump vault performed in August 2000, indicated radiation levels ranged from 2 mR/h (general area) to 300 mR/h (on contact with the surge tank). A smear survey of the pump vault indicated levels <1,000 dpm/100 cm^2 to just over 20,000 dpm/100 cm^2 beta/gamma (all alpha results were <20 dpm/100 cm^2). The contamination was generally located in the sump; however, two smear samples (one approximately 7,400 dpm/100 cm^2 beta/gamma and the other smear <1200 dpm/100 cm^2 beta/gamma) came from the floor area between the surge tank and the pumps and from the pump area, respectively.

In addition to the contamination on the floor of the pump vault, approximately 9,800 gal of liquid waste are present in the tanks. Tank 1 (located on the north side) in the tank vault is empty and Tank 2 (also in the tank vault) contains approximately 9,600 gal of liquid waste. Tank 3 (the surge tank located in the pump vault) contains another 200 gal of liquid. Water apparently leaks into the tank vault as a result of snowmelt. Water is caught in the tank vault sump and subsequently transferred occasionally to the surge tank. It is estimated that nearly 200 gal have collected in a 15-year period. Samples of Tank 2 were collected in 1990[12] and 1994;[13,14] the 1990 samples were analyzed by gamma spectroscopy and the 1994 samples were analyzed by gamma spectroscopy, strontium (Sr)-90, and tritium (H-3). The 1990 results are the most conservative and are used for this assessment. The Sr-90 and H-3 results from the 1994

sampling are combined with the gamma spectroscopy results of 1990. Tank 3 samples were not analyzed for radionuclides; therefore, for this hazard assessment the inventory was added to the volume of Tank 2 and the analytical results for Tank 2 were used for the entire volume.

The samples collected in 1990 were also analyzed for RCRA-regulated hazardous waste characteristics and included volatile and semivolatile organic compounds. The samples did not exhibit the characteristics of EP toxicity for metals, corrosivity, ignitability or reactivity.[15,16] Several volatile organic compounds were identified in the holding tanks (Tanks 1 and 2); however, these compounds were below the regulatory limits. Several semivolatile organic compounds were also identified. Section 4.2.4 provides a discussion of the highest positive sample results (for all three tanks) compared to the 40 CFR 302.4 reportable quantities (RQs).

4. HAZARD ASSESSMENT

The hazard assessment evaluates radiological hazards, hazardous material hazards, and other hazards. To evaluate the radiological and hazardous material hazards, the material inventory is compared to threshold quantities provided in DOE-STD-1027-92, 40 CFR 302.4, 29 CFR 1910.119, and 40 CFR 355.

Table 2 presents the results of this screening effort. The first and second columns list the specific TANO facilities. The third column lists the proposed hazard categorization from this study.

Hazards associated with the facilities described in Section 2 are standard industrial hazards. These hazards are mitigated by facility design, use of protective clothing and equipment, adherence to operating procedures, and/or safety training.

Table 2. Hazard categorization for TANO facilities.

Bldg	Description	Revised Hazard Categorization per this HAD
TAN-633	Hot Cell Annex	<3
TAN-628	Warehouse – WGS	<3
TAN-647	Radioactive Parts Security and Storage Area	3
TAN-648	Radioactive Parts Security and Storage Area	3
TAN-666	Radioactive Liquid Waste and Transfer Building	<3

Each building requires a different approach to the hazard assessment, due to the current uses for each. The HCA (TAN-633) is out of service and not being used, except for surveillance and maintenance activities; and utilities (electrical and heating and ventilation) have been shut off. The pool cleanup system is stored in a cargo container just outside of the HCA. TAN-666 is shut down, but 9,800 gal of radioactive liquid is stored in two tanks. TAN-628 is currently empty; however, WGS will begin using the building in the near future for waste storage. The RPSSA currently is storing radioactive waste from several completed projects at TAN.

4.1 Radioactive Materials

Radioactive material is present in each of the buildings or structures described in Section 2. Section 3 provides the radiological levels that may be found in each building or structure.

4.1.1 TAN-628

As mentioned in Section 3, WGS will store a wide variety of radioactive materials. TANO and WGS will operate the facility as a less than Hazard Category 3 facility, which will require facility personnel to maintain inventory levels less than the Hazard Category 3 threshold levels in Attachment 1 of DOE-STD-1027-92. The ratio comparing the total inventory with the DOE-STD-1027 thresholds must be less than one and the sum-of-the-ratios must also be less than one to maintain the categorization (less than Hazard Category 3). The WGS activity is currently in TAN-653 operating as a radiological, low hazard with an approved auditable safety analysis (ASA).[17]

4.1.2 TAN-633

As mentioned in Section 3, the HCA has residual contamination in the overhead and in the cells; however, areas that are frequented by personnel are free of contamination. This building is presently shut down, and personnel are not allowed in, unless an RCT surveys the area or areas being accessed. The cells are inaccessible and all material has been removed. The radioactive material inventory levels are considered above the NRASA criteria, but less than the DOE-STD-1027, Hazard Category 3 threshold levels. Any new activity in the HCA will require additional evaluation prior to the start of the activity.

EDF-2172[11] estimated 10.3 Ci of Cs-137 and 3.11 Ci of tritium (H-3) contained in the composite resin (all other radionuclides were less than 1 Ci). Table 3 provides the radionuclide results and compares the results with the STD-1027 threshold limits for a Hazard Category 3 hazard. Table 3 also provides a ratio of the threshold limits compared to the source term totals. Each ratio is less than one, which indicates the hazards are less than Hazard Category 3 levels. Also, the sum of the ratios (2.06E-01) indicates the overall radiological hazard associated with the total source term for the resin is less than Hazard Category 3 levels.

Table 3. Radionuclide inventory for the ion exchange resins at TAN-633.

Radionuclide	Source Totals (Ci)	STD-1027 Thresholds (Ci)	Ratio of Source/thresholds totals
Cs-137	1.03E+01	6.00E+01	1.72E-01
Cs-134	3.04E-03	4.20E+01	7.24E-05
Co-60	1.63E-03	2.80E+02	5.82E-06
Sb-125	1.45E-02	1.20E+03	1.21E-05
H-3	3.11E+00	1.60E+04	1.94E-04
Total Sr (Sr-89/90)	5.40E-01	1.60E+01	3.37E-02
		Total	2.06E-01

4.1.3 RPSSA

As mentioned in Section 3, the RPSSA is a storage area for radioactive material. Some materials are stored inside TAN-647 and TAN-648 and radioactive material is stored on the TAN-647 pad outside. The inventory list of items in the RPSSA includes radiation levels from <0.1 mR/h (general area) up to 250 mR/h at contact with equipment.

4.1.4 TAN-666

Table 4 evaluates the radionuclide inventory from the tanks in the facility as described in Section 3. Column 1 of Table 4 lists the radionuclides analyzed during the sampling activities and Column 2 provides the highest concentration in microcuries per milliliter (μCi/mL) for each radionuclide. Column 3 provides the total volume of liquid found in Tanks 2 and 3 (9,800 gal is equivalent to 3.71E+07 mL). Note: The 200 gal in the surge tank (Tank 3) was sampled, but not analyzed for radionuclides; therefore, for this assessment the most conservative results of Tank 3 were used. Column 4 of Table 4 provides the total activity in μCi for each radionuclide and Column 5 converts the activity from μCi to curies (Ci). Column 6 provides the STD-1027 thresholds for a Category 3 hazard and Column 7 provides the ratio of the activity of each radionuclide with the threshold of each radionuclide. All of the radionuclides have a ratio of less than 1, which indicates the hazards are less than Hazard Category 3 levels. Also provided is the sum of the ratios (5.80E-02), which indicates that the overall radiological hazard associated with the total inventory of liquid waste in the tanks is less than Hazard Category 3 levels. The complete evaluation is documented in EDF-3412.[19]

In addition to the inventory associated with the water, the surge tank has a contact reading up to 300 mR/h. The specific origin of the reading is unknown; however, for this evaluation it is assumed that a layer of solid material is located on the bottom of the tank. MicroShield[18] was used to estimate the inventory that may be located on the bottom of the tank and the results are provided in EDF-3412.[19] The MicroShield input data was proportional to the inventory for the water sample results (i.e., the same radionuclides and the percentage of each radionuclide were used). The results show an increase of approximately 2% over the total activity in Table 4 due to the solid material. Note that tritium and Sr-90 were not included in this evaluation due to both radionuclides being pure beta-emitters which did not contribute to the direct radiation levels. The increase of 2% does not appreciably affect the ratio of each radionuclide or the sum of the ratios.

Table 4. Radionuclide inventory for TAN-666.

Radionuclides	Highest Activity (μCi/mL)	Volume (mL)	Total Activity (μCi)	Total Activity (Ci)	STD-1027 (Ci)	Ratio of STD1027/Total Activity
Am-241	4.20E-04	3.71E+07	1.56E+04	1.56E-02	5.20E-01	3.00E-02
Co-60	4.00E-04	3.71E+07	1.48E+04	1.48E-02	2.80E+02	5.29E-05
Sb-125	2.10E-04	3.71E+07	7.79E+03	7.79E-03	1.20E+03	6.49E-06
Cs-134	1.60E-04	3.71E+07	5.94E+03	5.94E-03	4.20E+01	1.41E-04
Cs-137	3.00E-02	3.71E+07	1.11E+06	1.11E+00	6.00E+01	1.85E-02
Eu-154	1.10E-04	3.71E+07	4.08E+03	4.08E-03	2.00E+02	2.04E-05
Eu-155	4.30E-05	3.71E+07	1.60E+03	1.60E-03	9.40E+02	1.70E-06
Sr-90	4.00E-03	3.71E+07	1.48E+05	1.48E-01	1.60E+01	9.25E-03
H-3	5.40E-04	3.71E+07	2.00E+04	2.00E-02	1.60E+04	1.25E-06
					Total	5.80E-02

4.2 Chemical Materials

4.2.1 TAN-628

WGS will store a variety of chemical materials in TAN-628. Table 1 lists some typical materials that may be stored as part of the WGS activities within the building. The chemical inventories must be maintained less than the criteria to preserve the low hazard classification.

4.2.2 TAN-633

The chemical hazards for TAN-633 HCA are estimated to be less than the RQs of Table 302.4.

4.2.3 RPSSA

As stated in Section 3.1.3, the RPSSA contains lead and depleted uranium used as shielded containers for sealed sources. Several waste boxes and drums containing lead, which is a part of an Inspector General investigation, are also stored in TAN-648. Other details on this material are incomplete. There is no other known chemical/hazardous materials stored in the RPSSA.

4.2.4 TAN-666

Table 5 evaluates the chemical/hazardous material inventory from the tanks in the facility as described in Section 3. Column 1 of Table 5 lists the chemical compounds analyzed during the sampling activities and Column 2 provides the highest concentration in micrograms per liter (μg/L) for each compound. Column 3 provides the total volume of liquid found in the tanks (9,800 gal is equivalent to 3.71E+07 mL). Note: The 200 gal in the surge tank (Tank 3) was sampled for hazardous compounds and generally the same RCRA-regulated compounds were found; however, the analytical results were lower. For this assessment the most conservative results were used. Column 4 of Table 5 provides the total inventory in μg for each compound and Column 5 converts the inventory from μg to kilograms (kg). Column 6 provides the 40 CFR 302.4 RQs and Column 7 provides the ratio of the inventory of each compound with the RQ of each compound. All of the compounds have a ratio of less than 1, which indicates the hazards below the NRASA criteria. Also provided is the sum of the ratios (2.76E-01), which indicates the overall chemical hazard associated with the total inventory of liquid waste in the tanks meets the NRASA criteria, as shown in Table 6.

4.3 Other Hazards

TAN-647 and TAN-648 are not discussed, as these facilities are Hazard Category 3. Other routine and occupational hazards present at the RPSSA will be discussed in the facility safety analysis report (SAR).

Management Control Procedure (MCP)-2451, "Safety Analysis for Other Than Nuclear Facilities,"[20] gives guidance on classifying activities that do not fall under the requirements of 10 CFR 830 Subpart B. A hazard can be determined to be an NRASA hazard if: (1) it is determined to be routinely encountered and accepted in the course of everyday living by the vast majority of the general public, and (2) it is determined that no further safety analysis is required. A hazard can be determined to be an NRASA hazard without additional hazard analysis if it is of a type listed in Table 6, and if it has a magnitude that does not exceed the criteria or thresholds in Table 6.

Table 5. Hazardous compounds inventory for TAN-666.

Analyte	Concentration (ug/L)	Volume (L)	Total (ug)	Total converted to kg	40 CFR 302.4 RQs (kg)	Ratio
Barium	2.21E+02	3.71E+04	8.20E+06	8.20E-03		
Cadmium	9.02E+01	3.71E+04	3.35E+06	3.35E-03	4.54E-01*	7.38E-03
Chromium	5.19E+01	3.71E+04	1.93E+06	1.93E-03	4.54E-01*	4.25E-03
Lead	3.08E+03	3.71E+04	1.14E+08	1.14E-01	4.54E-01*	2.51E-01
Mercury	2.91E+01	3.71E+04	1.08E+06	1.08E-03	4.54E-01*	2.38E-03
Cyanide	1.75E+01	3.71E+04	6.49E+05	6.49E-04	4.54E-01*	1.43E-03
Acetone	1.84E+02	3.71E+04	6.83E+06	6.83E-03	2.27E+03	3.01E-06
Dichlorodifluoromethane	4.68E+01	3.71E+04	1.74E+06	1.74E-03	2.27E+03	7.67E-07
Methylene Chloride	1.43E+01	3.71E+04	5.31E+05	5.31E-04	4.54E+02	1.17E-06
Xylene	1.30E+00	3.71E+04	4.82E+04	4.82E-05	4.54E+02	1.06E-07
Trichloroethene	1.07E+01	3.71E+04	3.97E+05	3.97E-04	4.54E+02	8.74E-07
1,1,1-Trichloroethane	3.29E+01	3.71E+04	1.22E+06	1.22E-03	4.54E+02	2.69E-06
Bis(2-Ethylhexyl)phthalate	1.21E+02	3.71E+04	4.49E+06	4.49E-03	4.54E-01	9.89E-03
2,4-Dimethylphenol	5.90E+00	3.71E+04	2.19E+05	2.19E-04	4.54E+01	4.82E-06
Phenol	1.87E+01	3.71E+04	6.94E+05	6.94E-04	4.54E+02	1.53E-06
					Total	2.76E-01

* Statutory RQ used, no final RQ listed for generic or broad class.

MCP-2451 requires further assessment of a facility if (1) the hazard analysis shows the potential for minor on-site and negligible off-site impacts to people or the environment and/or (2) it has one or more attributes which exceed the criteria for a NRASA facility but has none that exceed any of the following low-hazard, upper threshold criteria:

- Could not have potential personnel radiation exposure from sealed radioactive sources, radiation-producing devices, or nonreleasable radioactive material in excess of a total effective dose equivalent (TEDE) of 2 rem from a single event.

The WGS activities in TAN-628 may temporarily store any one of these types of materials; however, these materials will not produce a dose that will exceed 2 rem. The 300 mR/h dose rate located on the bottom of Tank 3 in TAN-666 is a concern with the potential of exceeding this criteria; however, access to Tank 3 is quite difficult. The access doors are locked and the keys are controlled, Tank 3 is not a normal work location (it is located in a tank vault), and signs and barriers warn personnel of the radiation hazard. Note: Radiological Control Technicians perform routine radiation/contamination surveys in the building. Based on this information and the fact that a person would have to be in contact with the tank and stay in that location for almost seven hours to exceed the 2 rem criteria; the hazard does not exceed this low-hazard, upper threshold criteria.

- Could not have material at risk (MAR) quantities of hazardous material that meet or exceed the 29 CFR 1910.119 threshold quantities or the 40 CFR 355 threshold planning quantities (TPQs) (if hazardous material is not listed in 29 CFR 1910.119).

Table 6. Comparison of NRASA criteria to hazards at the facilities discussed in Section 2.

Hazard Type	Criteria or Threshold Limits	Criteria or Threshold Exceeded?	Explanation
Standard industrial hazards	Applicable Occupational Safety and Health Administration (OSHA) regulations.	No	The standard industrial hazards at any of the facilities described in Section 2 are similar to hazards found in common industrial facilities.
Radioactive material	The material at risk (MAR) quantity of radioactive material, determined in accordance with DOE-STD-1027-92 methodology, is below the 40 CFR 302, Appendix B RQ limits.	Yes	Radioactive material is present in each of the buildings. Inventory estimates for TAN-666 are addressed in Table 4. Results indicate that the STD-1027 thresholds are not exceeded; however, the RQs from 40 CFR 302.4 are exceeded by Sr-90 and Cs-137. It is estimated that the inventory at the RPSSA exceeds the RQs from the 40 CFR 302.4 for several radionuclides and probably exceeds the STD-1027 levels. TAN-628 may have quantities of radioactive material greater than the RQs of 40 CFR 302 limits but less than the STD-1027 thresholds. The quantify of radioactive material in the TAN-633 HCA inventory is basically limited to the ion exchange resin; results indicate that the STD-1027 thresholds are not exceeded; however, the RQs are exceeded for Sr-90 and Cs-137.
Chemical hazards	The MAR quantity of chemical hazards is below the RQ limits in Table 302.4 of 40 CFR 302.	Yes	Chemical hazards may be greater than the Table 302.4 RQs for WGS activities at TAN-628; however, the MAR quantities will be less than the threshold quantities of 29 CFR 1910.119 and the threshold planning quantities of 40 CFR 355.
		No	Chemical hazards are estimated to be less than the RQs of Table 302.4 for TAN-633.
		No	Chemical hazards are less than the RQs for TAN-666 (see Section 4.2.3 and Table 4 for results).
		No	The lead stored in the RPSSA is in a solid form and used for shielding purposes. Considering the lead is not respirable, the RQs from 40 CFR 302.4 are not applicable.

Table 6. (continued).

Hazard Type	Criteria or Threshold Limits	Criteria or Threshold Exceeded?	Explanation
Nuclear criticality hazard	The inventory of fissionable material is less than 15 g of U-233, U-235, Pu-239, and Pu-241 in any area.	No	WGS activities at TAN-628 will have an inventory of less than 15 g of fissionable material.
		No	TAN-633 has been decontaminated and has residual contamination only.
		No	Fissionable material was not analyzed for in TAN-666 but is probably less than 15 g. The inventory estimates for the RPSSA are incomplete and difficult to determine the quantity of fissionable material. This will be evaluated in the SAR.
Field and low-level fixed x-ray equipment	The field and low-level x-ray equipment meets American National Standards Institute (ANSI) x-ray standards.	No	X-ray equipment is not used at any of the facilities or structures described in Section 2.
Toxic materials	Potential air concentrations of toxic materials are less than the Emergency Response Planning Guideline limit or its equivalent for substances exceeding 5 times the RQ values of 40 CFR 302.	No	Toxic materials are not present at any of the facilities or structures described in Section 2.
Flammable material	The inventory of flammable materials is not more than allowed by the National Fire Protection Association code for building occupancy classification.	No	The inventory of flammable materials at any of the facilities described in Section 2 is managed in accordance with National Fire Protection Association (NFPA) 30.
Explosive materials	The inventory of explosive materials is not more than allowed by the applicable Uniform Fire Code.	No	No explosive materials exist at any of the facilities or structures described in Section 2.
Lasers	The laser is ANSI Z136.1 Class I or II or Class III with an enclosed beam.	No	No lasers are located at any of the facilities or structures described in Section 2.
Electrical	Electrical sources are not more than 600 V, or if more than 600 V, not more than 25 mA, and not more than 50 J stored energy.	No	Electrical sources of more than 600 V are not used at any of the facilities or structures described in Section 2.
Kinetic energy	There are no unusual or unique high-kinetic energy systems.	No	No unusual or unique high-kinetic energy systems are used at any of the facilities described in Section 2.
Pressure	The pressure-stored energy is no more than 0.1 lb TNT equivalent if the pressure is more than 3,000 psig.	No	No pressure-stored energy is present at the facilities or structures described in Section 2 except for TAN-628. The TAN-628 gas cylinder storage area contains oxygen, helium, argon, acetylene, carbon dioxide, nitrogen, and P-10 gas cylinders that are used in other facilities in accordance with INEEL procedures (particularly PRD-5040, "Handling and Use of Compressed Gases.")[21]

Table 6. (continued).

Hazard Type	Criteria or Threshold Limits	Criteria or Threshold Exceeded?	Explanation
Extreme temperatures	The temperature is incapable of environmental interaction to cause strong overpressure, toxic products, or to initiate a release of hazardous materials.	No	No high or low-temperature systems are present at any of the facilities or structures described in Section 2. Temperature extremes due to weather may be encountered and proper precautions will be taken.
Biohazards	Special industrial hygiene controls are not required.	No	There is no evidence of biohazards other than those expected in a high desert environment, such as hantavirus, and/or snake and insect bites. Pigeon excrement may be present (Histoplasmosis) at TAN-666 and RPSSA.

TAN-666 contains phenol, which is listed in 40 CFR 355. The TPQ for phenol is 500 lb. The total inventory of phenol is calculated to be approximately 6.94E-04kg. The TPQ of 500 lb can be converted to approximately 227 kg (the ratio of the TPQ to the total inventory is 3.06E-06). No other MAR quantity constituent is known for TAN-633, TAN-628, and TAN-666.

- Could not potentially result in injury to more than five (5) people on-site from a single event.

TAN-666 and TAN-633 are both shut down and surveillance and maintenance activities do not typically involve more than one or two personnel. The WGS activities in TAN-628 will not typically involve more than three or four personnel at any one time. These buildings will not contain hazardous materials exceeding the 29 CFR 1910.119 threshold quantities or 40 CFR 355 TPQs.

- Could not result in any increased risk to the off-site public.

Based on the radioactive and chemical material associated with TAN-628, TAN-633 and TAN-666; the risk potential has localized consequences only.

- Could not potentially result in any environmental perturbations other than those which would have little discernable impact on the local ecological conditions and would be temporary and totally restorable by natural processes.

TAN-633 and TAN-666 are both shut down, with only surveillance and maintenance activities being performed. Potential environmental damage for the WGS activities at TAN-628 would be limited by the quantities of radioactive and hazardous materials stored in the facility and any environmental perturbation would be temporary and totally restorable.

In accordance with INEEL procedures, the TAN-628, TAN-633, and TAN-666 facilities described in Section 2 are designated as low hazard.

5. CONCLUSION—CATEGORIZATION/CLASSIFICATION/ DESIGNATION

In accordance with the requirements of 10 CFR 830, Subpart B, the categorization of all facilities described in Section 2, based on the postulated inventory of radioactive material, has been established as below Hazard Category 3 for TAN-628, TAN-633, and TAN-666. The RPSSA (TAN-647 and TAN-648) is at least Hazard Category 3, based on the limited information available. Further categorization of the facilities described in Section 2 follows the requirements of DOE ID Order 420.D and MCP-2451. The facilities described in Section 2 are further classified as low-hazard activities. An ASA will be required for TAN-628, TAN-633, and TAN-666 and the activities described in this hazard assessment for each of these buildings.

An ASA will be prepared for these buildings and activities consistent with the classification of "low hazard" and will be approved by Bechtel BWXT Idaho, LLC (BBWI). Inventory control for the WGS activities at TAN-628 will be delineated in the administrative controls of the ASA to ensure the inventory of radioactive and hazardous materials does not exceed the appropriate regulatory quantity and the integrity of the classification is maintained. Presently, WGS activities at TAN-653 are covered by an ASA that incorporates administrative controls to ensure the inventory of radioactive and hazardous materials do not exceed the integrity of the categorization and classification.[17] Any activities within the three buildings that are not described in this assessment will require operations to re-assess the categorization and classification for that particular building.

The RPSSA is currently incorporated in the TANO SAR, and based on the evaluation presented in this HAD, the facility will remain in the TANO SAR pending completion of inventory evaluations and/or disposal of equipment/waste.

6. REFERENCES

1. 10 CFR 830, Subpart B, "Safety Basis Requirements," *Code of Federal Regulations,* Office of the Federal Register, January 10, 2001.

2. DOE-ID Order 420.C, "Safety Basis Review and Approval Process," U.S. Department of Energy Idaho Operations Office, July 17, 2000.

3. DOE-ID Order 420.D, "Requirements and Guidance for Safety Analysis," U.S. Department of Energy Idaho Operations Office, July 17, 2000.

4. INEEL, *Safety Analysis Report for Test Area North Operations at the Idaho National Engineering and Environmental Laboratory*, INEL-94/0163, Rev. 16, November 2002.

5. HAD-89, "TAN Area Utility Buildings and Structures and Other Non-Nuclear Facilities – Facility Hazard Classification," Rev. 0, March 2000.

6. PLN-069, "Radiological Characterization of TAN-628 Facility," Rev. 0, September 2002.

7. W. C. Craft Interoffice Memorandum to D. L. Kudsin, "Radiological Status Survey of TAN-628 and TAN-606," WCC-01-02, September 25, 2002.

8. D. E. Sheldon notegram to S. M. Thraen, "Contents of TAN-653," January 1999.

9. 40 CFR 261, "Identification and Listing of Hazardous Wastes," *Code of Federal Regulations*, Office of the Federal Register, February 24, 2003.

10. PRD-183, "Radiation Protection - INEEL Radiological Control Manual," Rev. 6, July 6, 2000.

11. EDF-2172, "Source Term Determination for Shipping Requirements of the ATG Resin Used for TAN Storage Pool Clean-up," Rev. 0, April 30, 2002.

12. T. C. Sorensen Interoffice Correspondence to D. Harvey, "RML/Radiochemistry Analysis of TAN-666 Tank Samples, Tanks 1 and 2 – February, 1990," TCS-07-90, March 2, 1990.

13. J. A. Daley Interoffice Correspondence to M. W. Banister, "One TAN 666 Radioactive Liquid Waste Sample," JAD-19-94, May 24, 1994.

14. B. K. Schuetz Interoffice Correspondence to D. Harvey, "TAN 666 Rad. Liquid Waste Results," BKS-09-94, June 15, 1994.

15. K. C. Wright Interoffice Correspondence to D. Harvey, "Data Evaluation of TAN 666 Holding Tanks Samples," KCW-14-90, May 7, 1990.

16. K. C. Wright Interoffice Correspondence to D. R. Harvey, "Data Evaluation of TAN-666 Sump Tank Samples," KCW-24-90, June 19, 1990.

17. ASA-653, "Auditable Safety Analysis Report for TAN-653," Rev. 1, May 2000.

18. Microshield, Version 5, Grove Engineering, 1998.

19. EDF-3412, "Hazard Assessment Calculations for TAN-666 in Support of Re-categorization," Rev. 1, R. W. Jones, March 5, 2003.

20. MCP-2451, "Safety Analysis for Other Than Nuclear Facilities," April 5, 2001.

21. PRD-5040, "Handling and Use of Compressed Gases," Rev. 1, May 14, 2002.